

**PARAMETERS OF TENSILE STRENGTH, ELONGATION,
AND TENACITY OF 70mm IlaO SPECTROSCOPIC FILM**

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ABSTRACT

70mm IlaO spectroscopic film was tested to determine its tensile strength, elongation, and breaking strength, using an Instron (strength & compression) 4201 Test Instrument. These data provides information leading to the upper and lower limits of the above parameters for 70mm IlaO spectroscopic film. This film will be developed by a commercial developing machine after the Ultraviolet Telescope Space Shuttle Mission returns to the earth in the early 1990's; thus it is necessary to understand these force parameters.

Several test strips of approximately 200 mm in length were used. The results indicate that when a stress load of 100 kg was applied, the film elongated approximately 1.06 mm and the breaking strength was 19.45 kilograms.

PARAMETERS OF TENSILE STRENGTH, ELONGATION, AND TENACITY OF 70mm IIAO SPECTROSCOPIC FILM

Introduction

IIAO spectroscopic film is a special ultraviolet sensitive film which will be used on the ultraviolet imaging telescope to be launched by the space shuttle in the early 1990's. Quality control of this film is an important ingredient in understanding the various parameters that the film will undergo in space and the extraterrestrial environment.

NASA uses a large commercial developing machine to develop its 70mm IIAO spectroscopic film. During the process, the film is exposed to various forces that could cause possible stress or strain on the film. The purpose of this research is to study the parameters of elongation (strain), tenacity strength (breaking point), and tensile strength (load strength) of 70mm IIAO spectroscopic film.

Materials and Methods

Five samples of developed and five samples of undeveloped 70mm IIAO spectroscopic film were cut to a gage length of 5 inches for testing purposes. An Instron 4200 strength and compression instrument was used to test the properties of elongation and tenacity of the film. Each sample was exposed to a maximum load range of 500 kg for stretching purposes. The film was put in a 2-inch grip on the instrument and stretched to its breaking point. Elongation curves for each sample were made using a graphic recorder connected to the Instron instrument for further analysis.

Results

From the analysis of the elongation curves, the undeveloped film shows greater strength than do the developed film samples. The undeveloped film appears to begin stretching at a load range of 50 kg and continues stretching until it reaches a breaking point at approximately 86 kg. The undeveloped film appears to elongate a total of 2 inches during the experiment. The developed film appears to stretch at approximately 30 kg and continues stretching until it reaches a breaking point of approximately 75 kg. The developed film appears to elongate a total of 1.5 inches during the experiment.

Discussion

The adhesive properties of the undeveloped film appear to give the film added strength as compared with the developed samples. These results are demonstrated by the differences in the breaking points of the undeveloped film versus the developed film samples. The tension associated with the developing machine is needed in order to complete this study. This information will be obtained when the machine is set up again at Goddard's Laboratory of Solar Physics. Most of the concern for stretching of film is with the science of astrometry where very crude and sensitive measurements are needed relative to distances and positions of stars. If film stretches in the machine by any significant amount, it could distort images and sensitive measurements that are made by researchers in astrometry.

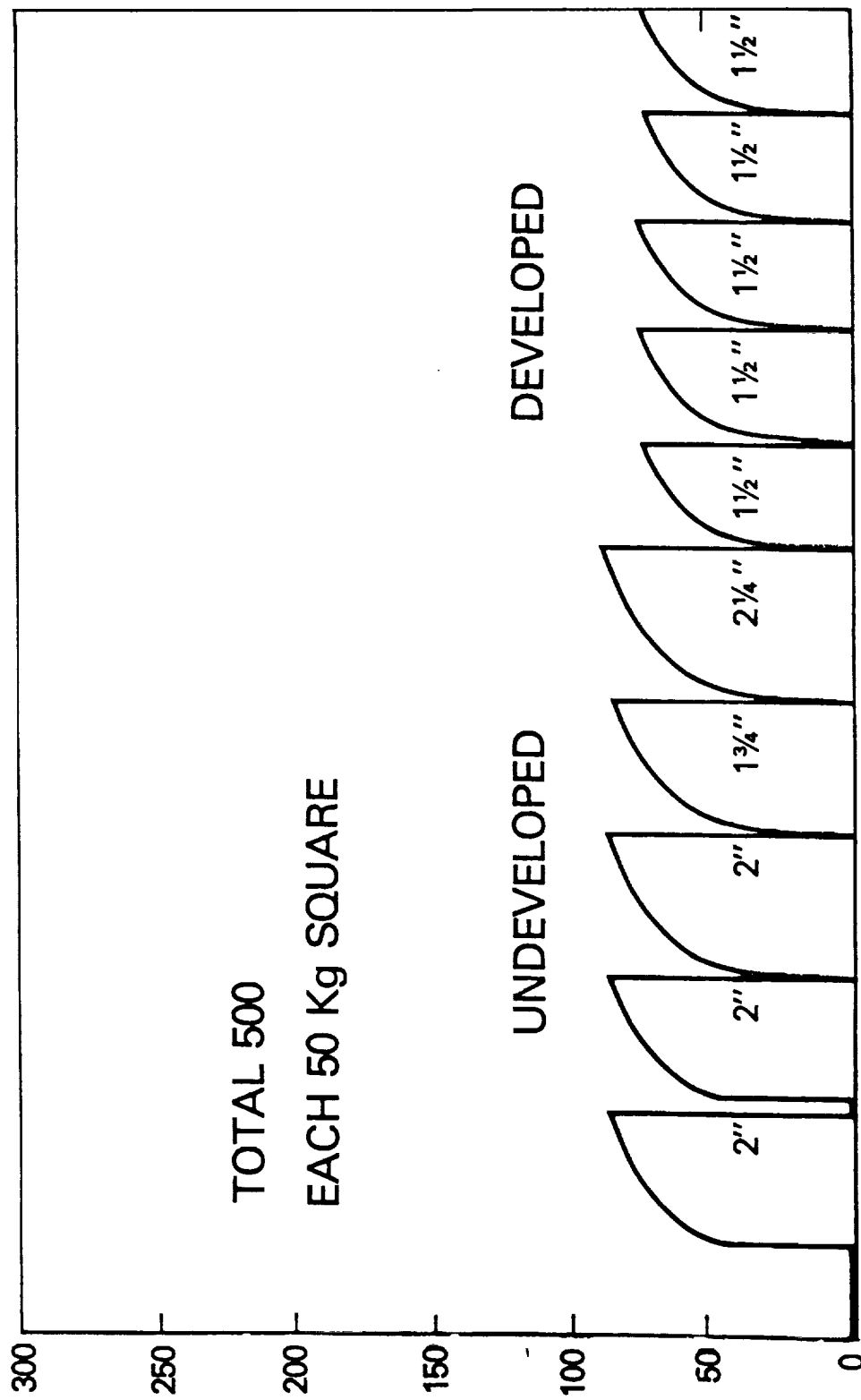


Figure 1.